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AN ANALYSIS OF FACTORS AFFECTING THE  
ELECTRONIC DELIVERY OF CONTRACTOR DATA

THESIS

Kenneth J. Farkas  
Captain, USAF

AFIT/GSM/LSY/91S-9

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**AFIT/GSM/LSY/918-9**

**AN ANALYSIS OF FACTORS AFFECTING THE  
ELECTRONIC DELIVERY OF CONTRACTOR DATA**

**THESIS**

**Presented to the Faculty of the School of Systems and  
Logistics of the Air Force Institute of Technology  
Air University**

**In Partial Fulfillment of the  
Requirements for the Degree of  
Masters of Science in Systems Management**

**Kenneth J. Farkas, B.S.  
Captain, USAF**

**September 1991**

**Approved for public release; distribution unlimited**

## Preface

The objective of this research was to perform an exploratory study to determine the extent electronic delivery of contractor data is being used on government contracts. While here at AFIT, I learned to coordinate study packages and briefing guides with fellow students through the use of E-Mail, usually without the need for a hardcopy with the final product. With this capability, came the thought of whether electronic communication could be applied on a larger scale to government contracts.

To complete the tasks associated with this thesis project required the help of friends and family. I want to thank my faculty advisors, Captain Kevin P. Grant and Mr. Arthur Munguia for their assistance and patience in guiding me through the proper courses of action. I also want to thank my parents for their support and prayers as I completed the project.

Most of all, I want to thank my wife Dawn, for her understanding and love as I struggled through many a late night. And although the littlest, but not the lastest, I want to thank Nathan, Zachary and Veronica for their help throughout the process, especially in assembling the survey packages. Thank you.

Ken Farkas

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Abstract

The research was performed to explore the extent that electronic delivery of data is being used within the Aeronautical Systems Division (ASD) and the Human Systems Division (HSD). Surveys were administered to acquisition personnel at ASD and HSD to determine the data management and computer training that they have received, the computer resources available to them and whether or not these individuals are working on programs that require the electronic delivery of data. Additionally, a telephone interview was conducted with the points of contact for 109 contracts awarded within ASD from Oct 89 to May 91 to determine electronic data delivery usage on current contracts.

The results indicate that 59% of the individuals are trained in data management, and only 29.5% were able to successfully choose the correct DODI 5000.2 requirement concerning the digital delivery of data. Of the 109 contracts reviewed less than 10% were using electronic delivery of contractor data. The most common barriers to electronic delivery of data mentioned by respondents included lack of guidance, resources, and training as well as working with small businesses. A positive aspect is that 11.7% of the survey respondents stated that future contracts will require the electronic delivery of data.

**AN ANALYSIS OF FACTORS AFFECTING  
THE ELECTRONIC DELIVERY OF  
CONTRACTOR DATA**

**I. Introduction**

**General Issues**

Throughout the acquisition process, there is a high dependence on paper to communicate ideas and document program objectives and findings. Yet, the process to get to a final document, a request-for-proposal, or a technical data package is time consuming and requires excessive amounts of paper. General Yates, Commander of Air Force Systems Command, emphasized that the acquisition process is inundated by paper and that the Air Force must take advantage of current technology to provide data when needed, where needed, and in the proper format. (22:1)

**Problem Statement**

There is strong emphasis within the Department of Defense (DOD) to fully exploit the use of computers throughout the acquisition process, beginning with requirements definition and continuing through the entire life of the system. DOD Instruction (DODI) 5000.2, "Defense Acquisition Program Procedures," requires that contract data deliverables be prepared and used in digital form unless it

is not cost effective for the government (9:9B1).

Additionally, the Air Force Acquisition Executive states in a letter dated Nov 17, 1990, "In addition to the specific reporting requirements, it would seem that virtually all documents which flow between the program offices and contractors could be paperless." (21:1).

Although there are highly visible and established requirements to use electronic delivery of contract submittals, there are still many obstacles to overcome before a paperless data delivery system can be fully implemented. This research will attempt to identify these obstacles and where possible, identify solutions.

#### Objective

The objective of this research is to perform an exploratory study to determine the extent that electronic delivery of contractor data is being used on contracts within the Aeronautical Systems Division (ASD) and the Human Systems Division (HSD). The delivery of Contract Data Requirements List (CDRL) data as well as non-required contractual data will be investigated. Specific objectives are as follows:

1. Analyze the extent to which electronic data delivery is being used by program offices within ASD and HSD.

2. Identify the current requirements concerning digital delivery of contractor data and the anticipated benefits of using digital data versus paper copies.

3. Identify problem areas or perceived problem areas which prevent the effective use of electronic data delivery.

4. Determine what lessons can be gained from those program offices that have implemented or are attempting to implement the electronic delivery of contractor data?

#### Investigative Questions

To meet the research objectives, the following research questions must be answered.

1. Are program office personnel aware of the DOD requirements concerning digital data delivery?

2. Are the necessary program office personnel trained in data management?

3. Are the necessary program office personnel trained in the use of Electronic-Mail (E-Mail)?

4. Are personnel trained in the use of networked computer systems (Local Area Networks - LANS)?

5. Is electronic data delivery being applied to current Air Force acquisition programs within ASD?

6. Is electronic data delivery applied to all data items on contract? If not, which data items are received electronically?

7. When digital delivery is not applied, Why is it not applied?

8. When digital delivery is applied to a contract, what problem areas are encountered? What benefits are realized?

9. How is electronic delivery of data accomplished?

10. Are any additional forms of contract correspondence electronically transferred between the government and contractor?

### Scope of Research

There is a push within the DOD to develop a completely paperless acquisition process, from requirements definition to request for proposal preparation through source selection and then into contract execution. This research will focus on the latter phase -- contract execution; particularly, the delivery of contract data deliverables.

### Summary

The purpose of this chapter was to provide a brief overview of the issues associated with the DOD's move toward a paperless acquisition process. Additionally, it presented the problem statement, objective of this study, and specific research questions. Chapter II will provide a more detailed review of the literature concerning the electronic delivery of data. Chapter III is a discussion of the methodology used to carry out this research. Chapter IV is a summary of the results and Chapter V contains conclusions and recommendations based on the study's findings.

## II. Literature Review

This chapter provides background concerning the electronic delivery of data. Electronic delivery has several connotations which will be discussed; among these are electronic data interchange (EDI) and electronic-mail (E-mail).

### Key Terms

**Data:** Recorded information, regardless of form or characteristic (10:A8).

**Technical Data:** Recorded information, regardless of form or characteristic, of a scientific or technical nature (10:A8).

**Contract Data Requirements List (CDRL):** A list of deliverable data requirements that is authorized for a specific acquisition and made a part of the contract (7:8).

**Electronic Data Interchange (EDI):** "A computer to computer and application to application interchange of business transactions" (1:222).

Based on the definition of data, whether the information delivered to the government is on paper or in digital format, it's data. The key then is to determine the most efficient method to get data delivered to the government. Because of advances in technology and the sharing of data bases it may be more appropriate to get the government to the data. There are at least three efforts underway by the DOD to begin the process of electronic delivery of data. These are Computer-aided Acquisition Logistics Support (CALS), Contractor Integrated Technical

Information Service (CITIS) which is a subset of CALS, and Electronic Commerce through EDI.

Each of these will be reviewed; but emphasis will be placed on Electronic Commerce as this relates more to the everyday correspondence that flows between two business partners. In the case of government contracts, the two business partners are the US government and the particular contractor.

In the preceding paragraph, government is used primarily to indicate the system program office or government contracting activity. These entities have regular contact with the contractor; whereas some functional representatives and using organizations only receive contract data when it is time for it to be reviewed. Therefore, one must keep in mind that an efficient system must allow for delivery to multiple addresses.

The review process of contractual data begins with the contractor collecting information and formatting the information in accordance with the CDRL. The data is then:

1. Mailed to the government and depending on the method used for mailing, the data is received one to ten days later.

2. Copies are made and distributed for review and comment. If sufficient copies were received from the contractor this step is not necessary; however, comments must still be solicited by the office of primary responsibility (OPR) for that CDRL item.



3. The comments are received and consolidated by the OPR.

4. Comments are sent to the contractor for incorporation into the next submittal of that CDRL item.

5. The process starts over again.

Each step in this process can be improved and expedited using electronic delivery. Application of EDI or other similar information technologies could significantly improve the timeliness of the contracting process, increase competition, and lower the cost of contracting efforts (6:6-2-1).

#### Computer Aided Acquisition Logistics Support (CALS)

"CALS is a DOD and Industry strategy to effect the transition from the current paper-intensive design, manufacturing and support processes to a highly automated, integrated mode of operation for future weapon systems (10:IV, 8:12). Originally CALS was a DOD strategy only, but industry was later added when it was realized that industry was half the team and played an important role.

On 24 September 1985, the Deputy Secretary of Defense issued a memorandum that defined the key objectives of CALS. These objectives have been modified slightly to emphasize the program life-cycle and are as follows:

1. To accelerate the integration of reliability and maintainability design tools into contractor computer-aided design and engineering systems.

2. To encourage and accelerate the automation and integration of contractor processes for generating weapon system technical data in digital form.

3. To rapidly increase DOD's capabilities to receive, store, distribute, and use logistic technical data in digital form to improve weapon system maintenance, training, and spare parts procurement (10:IV,8:12).

CALS is a term that is associated with all forms of electronic delivery of data. However, the main focus of CALS is to facilitate the integration of digital technical information only. Technical is underlined to emphasize the fact that the definition of technical data includes only that data that is of a scientific or engineering nature and does not include computer software or administrative data such as financial and or management information (10:45). However, the basic assumptions and concepts of CALS are similar to those of CITIS and EDI. MIL-HDBK-59A describes the CALS system of systems approach which consists of four key elements:

1. Industrial systems, (i.e., design, manufacturing, and customer support).
2. Government systems, (i.e., acquisition and logistic support).
3. Interfaces between industry and government.
4. Interfaces within industry among prime contractors, subcontractors, and vendors (10:52).

Elements not accounted for in this systems approach are the interfaces within the government among program

offices, users, and Air Logistics Centers. These interfaces exist to a limited degree through the Defense Data Network (DDN) and will be discussed later.

There are three broad groups of requirements documents that constitute the CALS interchange standards (10:52).

1. Functional Standards - tailored versions of existing MIL-STDs and specifications and contractual statements of work.
2. Technical Standards - relevant conventions for the management, formatting, and physical or telecommunications exchange of digitized text, graphics, alphanumerics and other forms of data.
3. Data Standards - data dictionaries and other conventions needed for access to data bases (8:15,10:52).

#### Contractor Integrated Technical Information Services (CITIS)

There are three methods for obtaining data through government/industry interchange. These three methods are hardcopy documents, digitized processable files, and interactive access. This interactive process is rapidly evolving into CITIS.

CITIS are contractor developed and managed information services that are made available for automated access and transfer to authorized users with a need to know (10:54). Through CITIS, data that is applicable to more than weapon systems must be available to users without unnecessary storage redundancy. CITIS is an interactive service with users who may be involved with similar weapons systems; therefore, standardization among data bases is essential to allow for the free interchange of data. This means that

each contract must identify to the contractor the requirements for access to and interaction (from and to the government) with the data base (system availability, maximum response time, equipment, etc...) as well as defining the data product in terms of the data elements and data relationships that comprise the data base to be accessed (10:77).

#### Electronic Data Interchange (EDI)

EDI is the process in which computers talk to computers to pass information automatically, electronically with little or no human interaction. EDI is common in the commercial sector, especially for the transfer of funds (1:225). For example, many companies including the Federal Government encourage the use of direct deposit of paychecks. Why? Because it costs less and is more efficient. Rather than send a check to each individual employee, the employer (company) collects pay deposits by financial institutions and then electronically transfers the lump sum pay deposits to the appropriate financial institutions for deposit into each individual's account. Besides saving postage, the company does not have the administrative burden associated with manually processing the checks. The electronic delivery of funds is more efficient because there are no lost or misplaced checks, the deposit is immediately available for the employee's use, and there is also better

and more accurate record keeping of the pay process. All this is accomplished without human interaction.

A similar scenario for EDI was established between the Columbus, Ohio based Satellite Glass Corporation and a San Antonio, Texas based insurance company, the United Services Automobile Association. The two companies are using an electronic billing system which has improved the speed and accuracy with which invoices are processed while saving an estimated \$25.00 per invoice. The companies process approximately 30,000 invoices per year, for a total annual savings of \$750,000 (20:17,19,30).

Similar savings are possible within the DOD. For the most part, the DOD is primarily using EDI for some ordering transactions of commercial items or for military items available through commercial distribution channels. These EDI transactions are limited to a \$25,000 threshold by Federal Acquisition Regulation (FAR) Part 13, Small Purchase and Other Simplified Purchase Procedures. Contracting actions of under \$25,000 accounted for almost 98% of the 15 million prime contract awards in FY88 (12:IV,1-43,2-4). With this number of contract awards each year, the potential for EDI use within the DOD is enormous!

### Networks

Communication networks permit the fast interchange of information among the users of the network (16:3). Networks are typically designated as either a Local Area Network

(LAN), a Metropolitan Area Network (MAN) or a Wide Area Network (WAN). This designation depends on the size of the network. A LAN is the smallest and most common.

A LAN is defined as "a data communications system allowing a number of independent devices to communicate directly with each other, within a moderately sized geographic area over a physical communications channel of moderate data rates," (16:4). There are four key elements to this definition:

1. Allows a number of independent devices to communicate directly with each other to support station-to-station communication.
2. Within a moderately sized geographical area, typically within a single building or group of buildings but not normally over a span greater than 10 km.
3. Over a physical communications channel, devices are hooked together directly or via other communication medium to make the physical connection. The traditional LAN design incorporates at least one of three cabling methods: twisted pair, coaxial, or optical fiber.
4. Supports a moderate data rate, typically 1 mbps (mega byte per second) to 10 mbps, but with fiber optic cable, rates up to 100 mbps are possible.

Metropolitan Area Networks typically link sublevels of an organization over an area of 1 km to 10 km. A wide area network ties together users who are widely separated (over 50 km apart) geographically (16:3).

The use of organizational wide networks such as DDN is becoming more prevalent in the commercial environment. It is estimated that after 1991, 60% of all network users expect to have organization wide networks in their firms

(17:42). Figure 1 below shows the current and projected percentage of sites with networked computing systems. Organization wide networks are evolving from the departmental networks so that a large percentage of smaller networked systems will be interconnected. The Departmental, Sitewide, and Organizational Networks can be equated to the Local Area, Metropolitan Area and Wide Area Networks respectively.

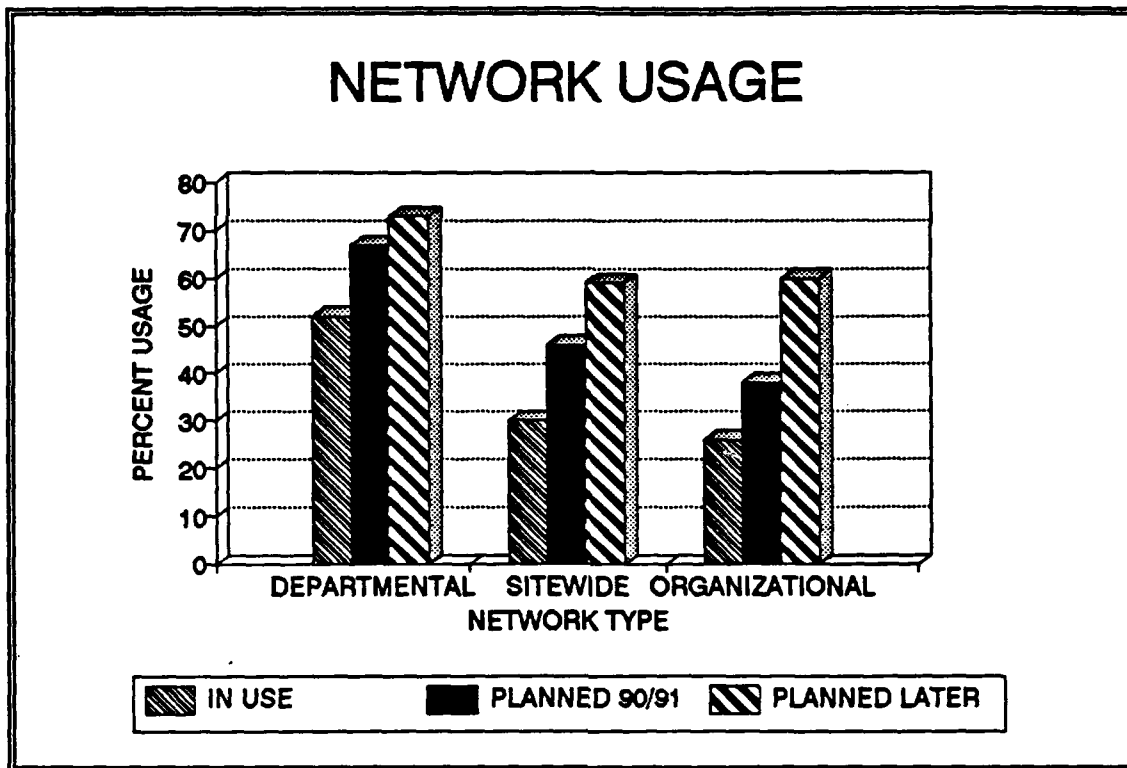


Figure 1. Network Usage (17:42)

#### Electronic Mail (E-Mail)

Electronic Mail is defined as "electronic text message that can be sent to a remote computer and stored for retrieval only by a selected addressee," (1:243). This is a general definition that, as computer technology advances, will include an even larger variety of message types. The two key concepts of the definition are as follows:

Electronic Text Message. Currently, "electronic test message" refers to a word message send and stored in a digital format. As will be discussed later in this section, it's possible to transmit more than just text messages through E-Mail by sending fax messages through the computer.



Therefore, for the purpose of this study, E-Mail will be used to describe both graphics as well as text messages.

Sent to a remote computer and stored for retrieval only by a selected addressee. This remote computer can be a central host computer or part of a network system. The significance of this part of the definition is that one does not have to be immediately present to receive an E-Mail message. Similar to postal delivery, where a letter remains in a mailbox until it is opened by the addressee, an electronic message is delivered and stored until the addressee retrieves it for review.

The host computer system may be a commercially available service such as CompuServe or a system operated by the using organization. Within the Department of Defense (DOD), there is a network of hosts that communicate with each other (2:16). This network is called the Defense Data Network (DDN) and is a data communications network that provides users with both data communication services and a medium over which heterogeneous computer systems can interoperate (19:4). Through the use of DDN, DOD personnel have the capability to communicate with any other member of the DOD if the addressee's username and its host computer designation are known.

There are benefits and obstacles associated with using E-Mail. The next sections discuss the benefits and the problems associated with the use of E-Mail.

Benefits. Several benefits associated with using E-Mail have been documented. A list of these benefits and a brief discussion of each follow:

Lowers delivery time/cost compared to conventional mail (5:12). A single business letter has been estimated to cost between \$7.00 and \$10.00 when one considers the cost of composing, typing, editing, retyping, and mailing the letter. This cost increases if express mail service is used. By comparison, the average electronic message costs approximately \$3.00 (1:70).

Reduces the number of attempts necessary to contact someone by telephone (5:12). As previously noted, if an addressee is not available, the electronic message is stored until the addressee can retrieve it. Upon receipt, the addressee can send an immediate response if necessary.

Deliveries to multiple addressees (1:71). Messages can be simultaneously sent to multiple addresses, at multiple locations. This multiple transmission can be accomplished very simply through the use of predefined mailing lists. In addition to not having to make photocopies of a document to be mailed out to several addressees, messages simply need to be coded to be sent to multiple addressees.

Eliminates excess paperwork and photocopying (5:12). E-Mail reduces the volume of paperwork in many ways. First, multiple addressing enables the sender to transmit one message to several addressees at the same time;

eliminating the need for multiple copies or photocopies. Also, if a message must be forwarded to an additional addressee, it can be recalled and transmitted electronically eliminating the need to make additional copies.

Eases problems created from different geographical boundaries and time zones (5:12). Messages can be sent and received at any time. Messages sent at one time are stored until the recipient is available to review them (1:71).

Provides recordability. Electronically delivered messages are received through a computer in a form that can be saved to a disk or printed. This is referred to as "recordability" (5:12). Also, these messages can be reformatted or modified and then transmitted to additional individuals.

Limitations. Drawbacks or limitations related to the use of E-Mail which were identified in the literature are discussed below.

Frequency of E-Mail review: If an individual fails to log on to the system, the messages can not be read. This can be overcome by establishing procedures which require individuals to connect to a system at regular intervals throughout the day. Also, common protocols can be designed within the computer to notify the user that there are new incoming mail messages to be reviewed.

Clutter. Access to electronic mail systems may lead to information overload. The increased volume of incoming messages may be difficult to assimilate and reports

of "garbage electronic mail" are prevalent (18:96).

Computer firms are currently working on filters that sort incoming messages based on subject title or originator. Additional protocols within the filter will allow the message to be scanned for key words to aid in the sorting process. As more LANS are interconnected the amount of E-mail traffic will increase. Devices that reduce mailbox clutter will become more valuable (3:286).

Original copies A fundamental issue concerning electronic delivery and computer storage is whether electronic transaction forms constitute an agreement that is legally sufficient to bind parties (12:4-1). Drake elaborate: "In commercial practice, EDI participants agree to be bound by electronic transactions in accordance with a trading partner agreement," (12:4-1). Legal acceptability of electronic medium transmission and storage is still under review.

Concerning optical (electronic) storage, one firm, the USAA is relying on the best available evidence rule when considering whether to destroy original documents after the document has been scanned and electronically stored. The best available evidence rule states that if the original is available, it must be entered as evidence in the case of legal dispute. If the original is destroyed, then the image becomes the best evidence available and the official business record (15:81).

For Electronic Data Delivery to become an acceptable mode of delivery, appropriate Federal Procurement regulations need to recognize EDI relationships and bind the contracting parties when certain electronic conventions are met (12:4-1).

### Facsimile Machines

Fax machines have been in use since the 1940s. Prior to 1967, most FAX machines were produced by Bell Telephone. In 1967, a ruling by the Federal Communications Commission (FCC) allowed for other than AT&T equipment to be connected to Bell Telephone lines. This ruling made competition possible in several markets to include the FAX machine. FAX machine usage continues to increase because the FAX is easy to use, fast, inexpensive, flexible and well standardized. (1:169-170).

In addition to the conventional Fax machine, PC-Fax systems are also gaining popularity. These systems utilize the Personal Computer's (PC's) capabilities by adding a "PC-Fax" board to one of the expansion slots on a PC. The main difference between a conventional Fax and a PC-Fax is that with a conventional Fax the document must be fed into a machine and the phone number dialed before the document is sent (1:178). The PC-Fax simplifies the process by allowing the Fax to be sent directly from the computer. An additional advantage is that a printout is not necessary for transmission. Also, like E-Mail, a message can be sent to

multiple addresses, and stored as a electronic file or hardcopy.

Despite these advantages, limitations also exist. Albright lists seven disadvantages of using a PC-Fax system. For instance, a PC-Fax system requires a scanner to send pre-existing documents. This requires extra hardware and software to send a document into the computer for transmissions. As technology advances, this will be less of a limitation. Further, if most of the transmissions are of materials (letter, forms, etc.) produced on a computer, a scanner may not be required (1:182). Also, a PC-Fax system also requires additional hard disk space. This hard disk space is necessary because fax output storage may occupy up to ten times the required storage as a similar ASCII output file.

For the price of a few stand alone fax machines or PC-fax boards, LAN managers can give all network users access to a fax server which allows fax service to be shared across the network. There are trade-offs in using a fax server versus a stand-alone fax. Fax servers may lead to processing delays and fax servers have trouble routing incoming faxes. However, it must be noted that the user may wait in line to send a fax in the conventional way over a fax machine. When using a fax server the wait is absorbed by the computer while the user is free to do something else. Routing incoming faxes could be accomplished by connecting all faxes to a central destination (administrative position)

and allowing that user to do the routing. Ideally, to limit disk storage usage, all fax processing and conversion should be performed at the server. This prevents an accumulation of disk storage space because ASCII file format does not require as much space as the standard fax output format.

### III. Methodology

This chapter describes the methodology used to complete the research objectives and to answer the research questions listed in chapter I of this thesis. The survey justification, the population from which the data was collected, the survey instruments used to collect the data, and data collection and analysis are discussed.

#### Justification of Survey

The information and data required to complete this study was not available, therefore it was necessary to collect primary data. Several methods of data collection were considered to include: observation, experimentation, personal interviews, telephone interviews, personally administered surveys, and mail surveys. A combination of mail surveys and telephone interviews was selected for several reasons. These factors include: the size of the populations, time constraints, the nature of the information, and most importantly, funding constraints.

Mail surveys are usually less costly, allow contact with individuals who might otherwise be inaccessible, allow respondents to take more time to complete the survey, and provide anonymity (13:172). The major weaknesses of the mail survey are nonresponsiveness and incompleteness due to excessive survey length (13:172). The response rate was not



a problem because the surveys were hand-delivered to each duty section for individual distribution.

Telephone interviews are inexpensive to complete especially if "callbacks" are necessary and if respondents are widely scattered. Also, the telephone interview allows for the study to be completed more quickly (13:170). The major weaknesses of the telephone interview are that the individual must be available by phone and that there are limits to the complexity of the questioning (13:171). The questioning was simple and because those interviewed were government employees, they had access to at least one telephone. The data collection strategy anticipated that callbacks would be required.

#### Population

Mail Survey. The population of interest for the mail survey portion of this study was Air Force acquisition professionals who are currently involved in data management activities to include data managers, data entry personnel, configuration managers, and program managers, as well as project engineers and logistics managers. There is no specific duty title or specialty code for data management positions; therefore, the sample for this study was taken from program offices at Aeronautical Systems Division, Wright-Patterson AFB and Human Systems Division, Brooks AFB respectively. These samples include offices from two of the four Air Force acquisition product divisions.

There were twenty data management offices identified at Wright-Patterson AFB and one data management office at Brooks AFB. The number of individuals assigned to each office was determined by contacting each office by phone. It was determined that there were approximately 195 individuals assigned to the data/configuration management offices. This number included contractor support personnel working in the area of data and configuration management.

Telephone Interview. The population of interest for the telephone interview portion of this study consisted of contracting personnel responsible for contracts awarded within ASD/PK from 1 October 1989 through 31 May 1991. This population was chosen because contracts awarded during this time had the opportunity to take advantage of advances in computer technology and accept the electronic delivery of data.

There were a total of 197 contracts awarded during this time: 118 from 1 October 1989 through 30 September 1990 and 79 from 1 October 1990 to 31 May 1991. Modifications to and options exercised on existing contracts during this period were not included in the sample population.

#### Survey Instruments

There were two survey instruments specifically developed for this effort. One instrument was a questionnaire used in the mail survey, and the second instrument was an interview guide used to support the

telephone interviews. The questionnaire and the interview guide are provided in Appendices A and B, respectively.

Approval. The HQ AFMPC/DPMYUS, Randolph AFB, TX granted the survey and interview approval, assigning the USAF Survey Control Number (SCN) 91-49. This SCN expired on 30 September 1991.

#### Data Analysis and Reduction

The data obtained through the survey questionnaires and telephone interviews was analyzed to answer the investigative questions outlined in Chapter 1. These investigative questions were addressed by either the survey questionnaire, telephone interviews or both. Table 1 provides a correlation between the investigative question, survey question, interview question and the method of analysis. The following sections provide the methodology used to answer each of the investigative questions, in this study.

Table 1  
Methodology Correlation Matrix

Investigative Question	Survey Question	Interview Question	Method of Analysis
1	7	--	Binomial Test
2	5	--	Descriptive Statistics
3	8,9,10,&11	--	Binomial Test Descriptive
4	14,15	--	Descriptive
5	16	2	Binomial Test
6	20	3	Descriptive
7	17	10	Descriptive
8	18,19	6,7	Descriptive
9	--	5	Descriptive
10	21	9,11	Descriptive

Investigative Question Number 1. Are program office personnel aware of the DOD requirements concerning digital data delivery?

Question number 7 of the survey questionnaire (Appendix A) was developed to determine whether program office personnel were able to identify the correct DODI 5000.2 direction concerning the digital delivery of data.

Responses to this question were categorized as either correct or incorrect. These categories were totaled for the sample at large and specifically for data managers. Statistical tests were run on this data to determine if acquisition personnel and specifically data personnel knew

the correct DOD policy. A binomial test was used because the data satisfied the requirements of independent Bernoulli trials. These requirements are as follows:

1. The experiment consists of a sequence of  $n$  trials, where  $n$  is fixed in advance of the experiment.
2. The trials are identical, and each trial can result in one of the same two possible outcomes, which are denoted as either a success or failure.
3. The trials are independent, so that the outcome on any particular trial does not influence the outcome of any other trial.
4. The probability of success is constant from trial to trial; we denote this probability by " $p$ " (11:98).

Responses to this question could be categorized as "successes" (answer "d" selected) or as "failures" (answer "d" not chosen). The probability of success for each trial was assumed to be constant as there was no reason to assume otherwise. The number of trials is fixed for the total number of questionnaires and finally, each of the  $n$  trials was independent.

Investigative Question Number 2. Are the necessary program office personnel trained in data management?

This question was asked to determine whether or not acquisition personnel are trained in data management procedures and techniques. The two courses in the area of data management taught at the Air Force Institute of Technology (AFIT) were provided as two of the possible responses along with the open ended third selection of "other". This was left open because there are a number of

data related courses taught by civilian institutions as well as other AFIT courses that may have blocks of information dedicated to instruction in the area of contractor data.

The responses to this question were compiled by functional area and as a total sample.

Investigative Question Numbers 3 and 4. Are the necessary program office personnel trained in the use of Electronic-Mail (E-Mail)? Are personnel trained in the use of networked computer systems? (Local area networks?)

Survey questions 8, 9, 10, 11, 12, 13, 14, and 15 were asked to examine E-Mail and LAN training and use. It is important to know if individuals have access to a computer. If access to a computer and a phone line are available, then it is possible to receive data electronically. Electronic mail, although similar on most systems, has some peculiarities unique to an individual system. Therefore, some training in the use of E-mail may be required.

Frequently, copies of a particular data item are required by individuals within the same functional entity. It's not uncommon for these functional entities or divisions to be linked together through a LAN. Therefore, the capability to pass information electronically over the same system or to have the capability for these individuals to have access to the same document would greatly enhance the operation of the organization. This would be particularly true when review of a document has resulted in a

consolidated comment list which must be transmitted to the contractor.

Questions 14 and 15 of the survey questionnaire were asked to ascertain if individuals are part of a Local Area Network and if they have been trained in the use of Local Area Networks.

Investigative Question Number 5. Is electronic data delivery being applied to current Air Force acquisition programs within ASD?

Survey question number 16 and interview question number 2 were asked to answer this investigative question. Survey question number 16 did not limit the respondent to discussing a specific contract but allowed the respondent to describe any contract that he or she may have been working. Although responses were not unique to particular contracts, the responses to this question can be totaled to represent the number of individuals currently involved in the electronic delivery of data. Interview question number 2 was asked to obtain a response concerning a particular contract and provides more detailed information regarding the percentage of current contracts that are using electronic delivery of data. For both of these questions, analysis was conducted using the binomial test.

Investigative Question Number 10. Is other contract correspondence electronically transferred between the government and contractor?

Survey question number 21 and interview question numbers 9 and 11 were asked to answer this question. Interview questions 9 and 11 are the same question asked in different situations in the interview process depending on whether or not a specific contract requires the electronic delivery of contractor data. Both of these questions were not asked of the same individuals, therefore, it was possible to combine these responses for summation and analysis without duplicating responses.

### Limitations

The samples for both the mail survey and interview were taken from configuration/data management offices at ASD and HSD respectively. As previously mentioned, the study was further limited because the list of contracts used as a sample for this study did not include modifications to existing contracts nor options exercised between 1 Oct 89 and 31 May 91. This limit is significant because it may be during these later modifications and options that the program offices and the contractor implemented an electronic delivery system.

The following chapter provides an analysis of the data collected through the mail surveys and interview process for the specific questions discussed in this chapter.



#### IV. Data Summary and Analysis

This chapter provides the results of the analysis performed on the data collected using the survey questionnaire and interview guide. A descriptive summary of results is provided along with the results of any statistical tests performed on the responses.

##### Survey Response Summary

A total of 78 questionnaires were returned from the original 217 survey packages distributed. These 78 questionnaires represent a response rate of 35.9 percent. Typically response rates of 30 percent or more are considered adequate for mail surveys (13:172). A breakdown of respondents by functional category is provided in Table 2.

##### Interview Summary

Sixty-two individuals were identified as suitable interview candidates. Forty-five persons were successfully interviewed, and these individuals were responsible for 109 of the 197 contracts awarded between 1 Oct 1989 and 31 May 1991.

##### Knowledge of Requirements

Only 23 of the 78 respondents knew that contract deliverable data will be prepared and used in digital form unless it is not cost effective for the government. The

binomial test provides the following 95% confidence interval on the true value of  $p$ :  $.20 \leq p \leq .42$  (4:445). Therefore, with 95% probability that the true proportion of individuals that know the DODI requirements is between 20 percent and 42 percent.

TABLE 2  
Functional Category of Respondents

Functional Category	Number of Respondents	Percentage of Total
Data Management	39	50.0
Configuration Management	30	38.5
Other:	9	11.5
N/A	2	2.6
PM	3	3.8
ENG	3	3.8
Log	1	1.3
Total	78	100.00

#### Data Management Training

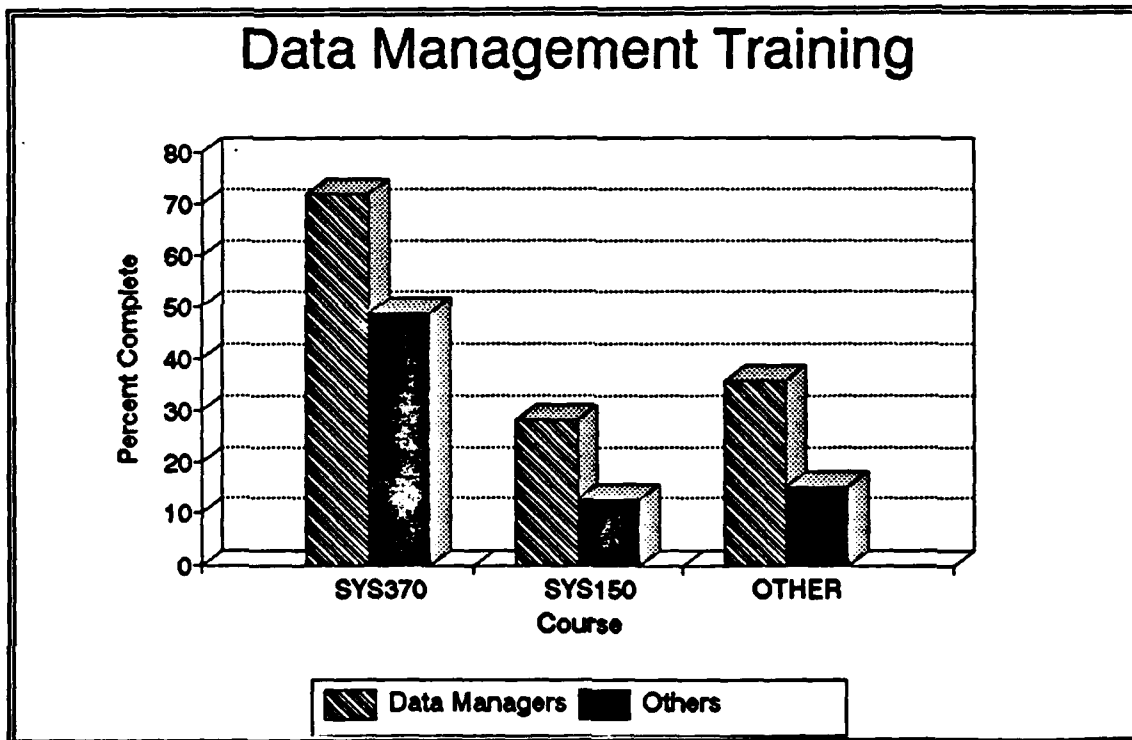
This research investigated the training received by individuals currently involved with data management activities. Data management training is summarized in Table 3 and Figure 2.

As noted in Table 3, 59% of all individuals surveyed have taken SYS 370, Defense Data Management. As expected, the greatest percentage (27 of the 47 individuals who have taken SYS 370) were data managers. Data and Configuration

**Table 3.**

**Data Management Training Summary**

	SYS 370	SYS 150	Other
Data Manager	27	11	14
Config	19	5	6
Other	0	0	0
TOTAL	46 (59%)	16 (20.5%)	20 (17.9%)



**Figure 2. Data Management Training**

Management personnel accounted for all those individuals who have received Data Management Training. The total number of data management personnel who have been trained through formal classroom work in data management is

31 out of a possible 39 for a percentage of approximately 80%.

#### Availability of Computer Resources

This research investigated the computer resources available to acquisition personnel. This included the availability of computer terminals or PCs as-well-as access to Local Area Networks. Only one of the respondents did not have either a personal computer on their desk or did not share a personal computer with others in the duty area.

In addition to personal computers, 16 of the 78 respondents had access to a VAX terminal in their immediate duty area. This value may be misleading because the term "VAX" is ambiguous. The intent of this response item was to determine how many individuals had direct access to the base E-mail system and subsequently to the Defense Data Network to transfer E-mail throughout the DOD. However, one does not need a dedicated VAX terminal in order to have access to the DDN, one only needs the proper software to allow communications from a personal computer into the VAX system. Therefore, some individuals may have indicated that they have access to a VAX terminal when in fact they were using an emulation program to communicate to the VAX from a personal computer.

A summary of those individuals that have access to a Local Area Network is provided in Figure 3. Of the 73

individuals that responded to this question, 56 (or 76.7 percent) indicated that they have access to a LAN. Only

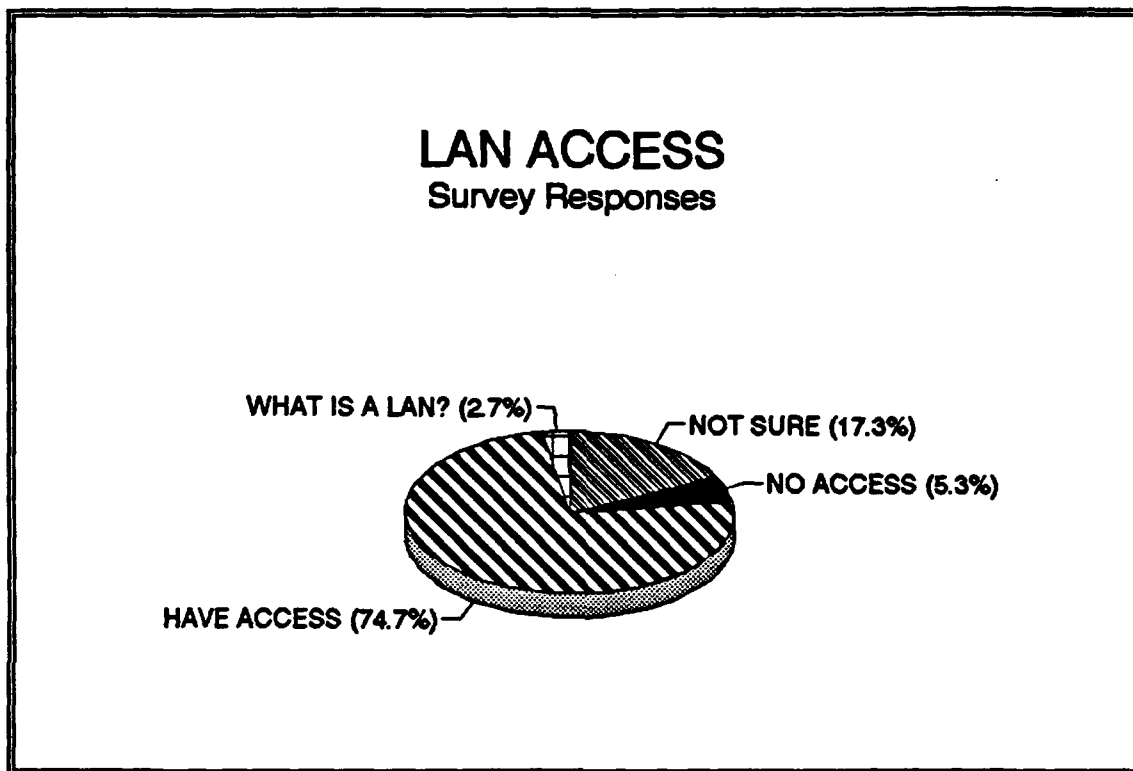


Figure 3. LAN Access

four (5.58 percent) of the individuals indicated that they did not have access to a LAN. A total of 15 (20.5 percent) of the individuals either did not know if they were connected to a local area network or did not know what a local area network was.

The binomial test indicates that the 95% confidence interval on the true value of  $p$  (probability that an individual was connected to a LAN given a random sample was taken) is  $0.82 \leq p \leq 0.96$ . In other words, with a 95%

confidence the true mean for the number of individuals that are connected to a LAN is between 82 and 96 percent.

### Computer Training

This research investigated the training acquisition personnel received in the use of Electronic Mail (E-Mail) and the level of usage of E-mail by acquisition personnel. A summary of E-Mail training is provided in Figure 4, a summary of E-mail usage is provided in Figure 5, and comparison of training received and daily usage of E-mail is illustrated in Figure 6.

Approximately 41% of the respondents received no formal training in the use of E-mail. However, almost 70% of the individuals use E-mail at least once a week and a majority (59.0%) of the individuals use E-mail at least once a day.

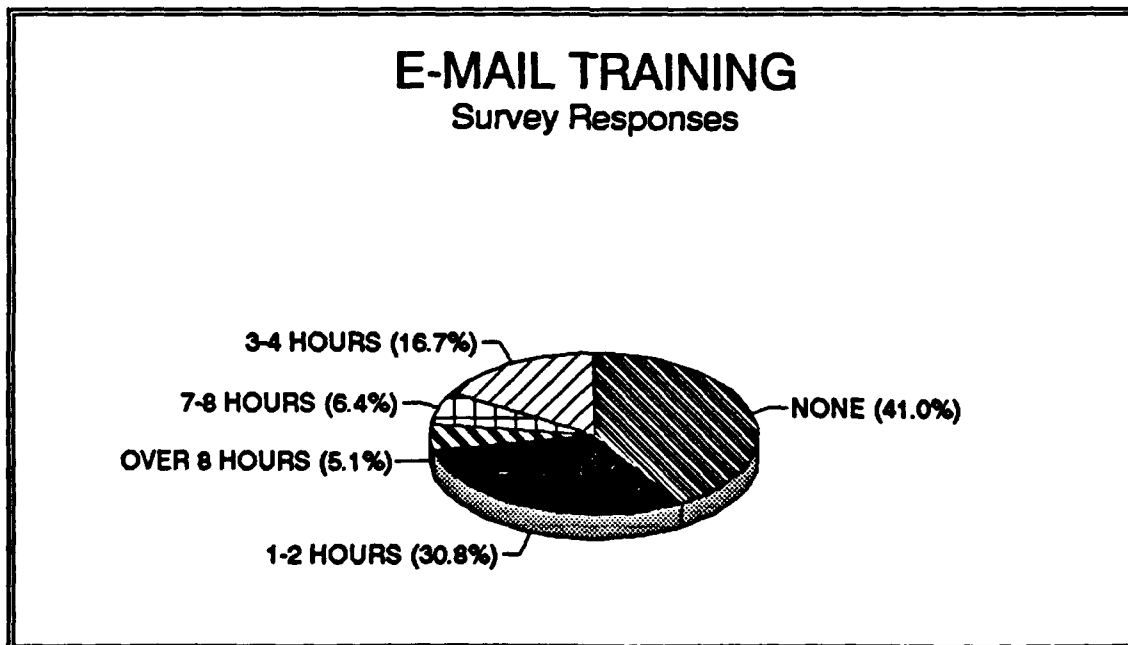


Figure 4. E-Mail Training

## E-MAIL USAGE

### Survey Responses

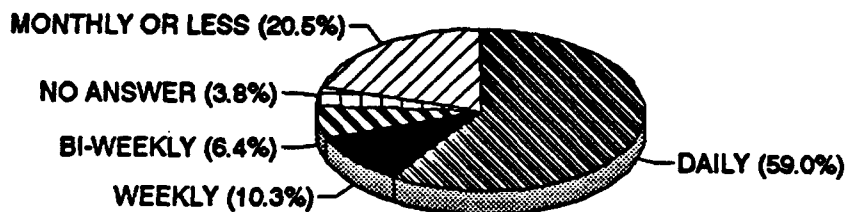


Figure 5. E-Mail Usage

As noted in chapter II, the value of E-mail is enhanced the more it is used. A further analysis of the data reveals that 18 (56.3%) of 32 individuals who received no training used E-mail at least once a day while 10 (31.3%) of these individuals use E-mail once a month or less. Also, 12 (50%) of the 24 individual who had only 1-2 hours of E-mail training use E-mail at least once a day.

For those individuals that received three or more hours of training, the E-mail usage rate of at least once-a-day was approximately 72%. Therefore, the data suggests that if individuals are provided with training, they would use E-mail on a more regular basis than those with no training.

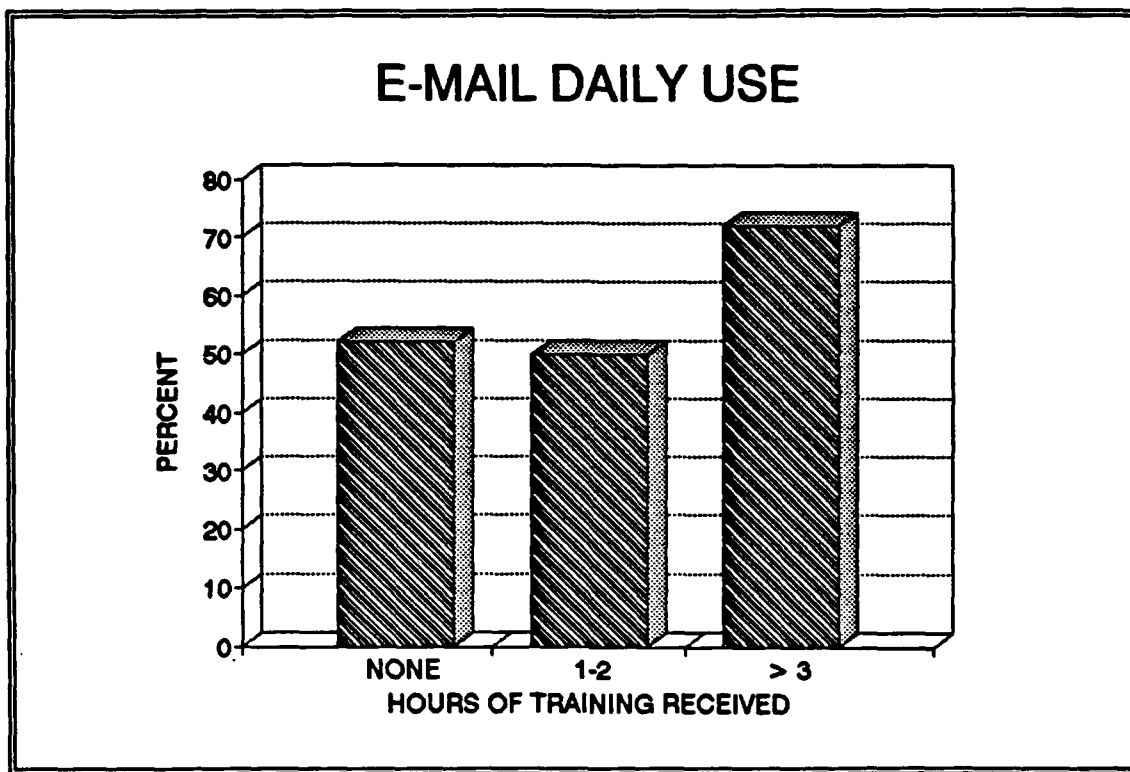


Figure 6. E-Mail Daily Use

#### User Name

Of the 78 survey respondents, 68 respondents knew their user name, 6 did not know their user name, and 4 individuals did not respond. A 95% confidence interval on the true value of  $p$  (probability that an individual would know their e-mail user-names given a random sample was taken) was obtained from a binomial confidence limit chart and is as follows:  $0.83 \leq p \leq 0.97$ . In other words, there is a 95% probability that the true proportion of individuals who know their own E-mail user name is between 83 and 97 percent.



### LAN Training

This research investigated how much LAN training was received by acquisition personnel. The results are illustrated in Figure 7. Of the 76 individuals who answered this question, 40 (52.6 percent of the total) have received

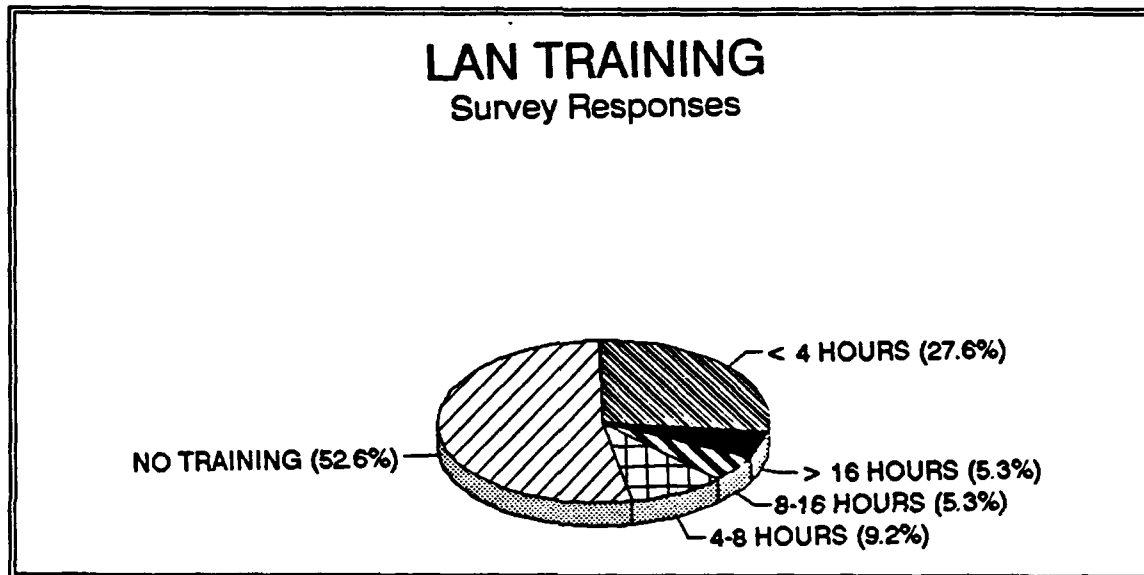


Figure 7. LAN Training

no training. An additional 27.6% have received less than 4 hours of LAN training.

### Application of Electronic Delivery to CDRL Item Data

This research explored the extent that electronic delivery of contractor data is being used on current contracts. Of the 109 interview responses, 7 reported electronic delivery of data was required. Of the 78 survey responses, 11 individuals indicated they were working on programs that required the electronic delivery of contractor data.

A 95% confidence interval on the true value of  $p$  (probability that electronic delivery of data is required on a program/contract) was performed for the responses to both the interview and survey responses. The following 95% confidence intervals were determined:  $0.04 \leq p \leq 0.13$  for the interview process, and  $0.09 \leq p \leq 0.24$  for the survey responses. With 95% confidence it could be expected that no more than 13% of contracts require electronic data delivery and no more than 24% of the individuals are working programs that require electronic data delivery.

There could be several reasons for the large difference between the expected values for the mean of survey responses and the interview responses. One reason could be that several respondents are assigned to the same program office, therefore, the survey responses may contain duplicates. Another reason is that, as mentioned in chapter III, the interview process responses were only applicable to contracts awarded from 1 October 1989 through 31 May 91. The survey responses were applicable to any current contracts to include modifications and options. Also, as noted above, although the interview respondents and the mail survey participants were taken from the same population (acquisition professionals) they were taken from different samples.

### CDRL Item Deliverables

This study also reviewed which CDRL items were being delivered through electronic means. Two of the seven respondents indicated that the contracts they are responsible for require all CDRL items be delivered electronically. For the remaining five contracts the most common items to be delivered were software related: the software code and software configuration items, and also the associated documentation. The following types of data are received electronically on at least one contract: provisioning data, test specifications, contract schedules, drawings and a post-production support analysis list.

### Benefits of Using Electronic Delivery of Data (EDD)

Interview responses and survey question responses were consistent with each other and were identified benefits similar to those revealed in the literature. Two of the seven contracts using electronic delivery of data were awarded very recently, consequently data has not yet been delivered. On four of the remaining five contracts, the use of electronic delivery for data has proved beneficial in saving time. Respondent also indicate E-mail requires less paperwork, provides more flexibility to manipulate contractor data for inclusion into larger reports, and provides the ability to more easily consolidate government comments for response to the contractor.

The results of the survey indicate that the speed of data delivery and the speed at which the government can respond to the contractor are the primary benefits. Also, the ability to distribute copies to others was mentioned twice (in one instance documents were retransmitted via DDN to other organizations). Additional benefits included more flexibility, ease of filing, less paperwork, and the ability to import part or all of one document into other documents.

#### Limitations of Using Electronic Delivery of Data (EDD)

The results indicate the most common limitations are incompatibility with contractor systems and lack of guidance concerning ways to obtain the electronic delivery of data. One interview respondent indicated technical "glitches" sometimes cause the government's computers to go down; however, even with this loss of time, delivery is still faster than using regular mail. It was also mentioned that a hard-copy is still necessary for the file, and it is easier to review a document if there is a hardcopy. One respondent noted that there are problems maintaining a document's configuration because documents are easy to change.

#### Barriers to Electronic Delivery of Data (EDD)

This research investigated the most common reasons electronic delivery of data is not being used. The survey and interview responses were categorized and Figures 8 and 9 show a comparison of the most common responses.

## BARRIERS TO EDD

Interview Responses

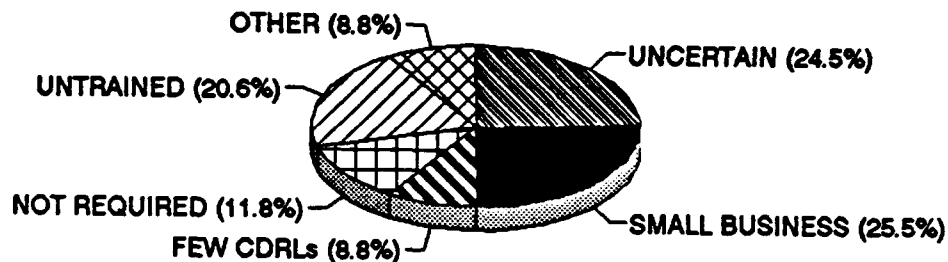


Figure 8. Barriers to EDD: Interview Responses

The most common response for each question was that individuals did not know why electronic delivery of data was not used. On 26 of the 109 contracts, electronic delivery of data was not used because the contracts were either small business research and development (R & D) contracts with few data items or were with a small business that did not have the capability to delivery data electronically.

The responsible individuals for 21 (20.6%) of the 109 contracts indicated that electronic delivery was not used because either they did not know the capability existed for the government to receive data electronically or government personnel were not trained to accept the data electronically. The responsible individuals for 12 (11.8%)

## BARRIERS TO EDD

Survey Responses

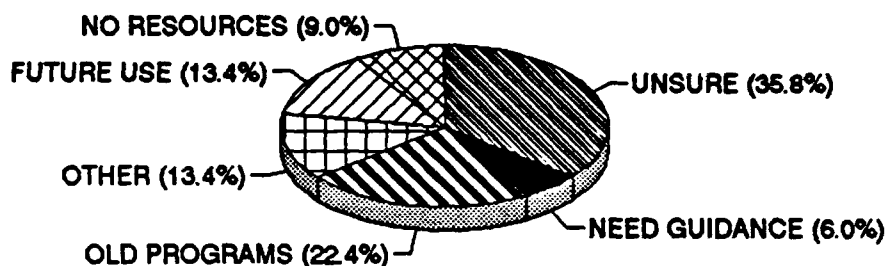


Figure 9. Barriers to EDD: Survey Responses

of the contracts stated that electronic delivery of data was not required (not put on contract by program, technical, or data management personnel) or was not considered at the time of contract award.

The results from the survey respondents indicate that many (22.4%) are working on older programs which did not require the electronic delivery of data. Another 9 (13.4%) responded that they are not currently using electronic delivery, but they are planning to use it on future procurements. Four individuals indicated that they needed guidance on how to write the requirements into a contract and how to receive the data. Also, another four other individuals felt that it was not cost effective to require

the electronic delivery of data. Six individuals stated that they did not have the resources or capability to receive data electronically.

#### Delivery Methods

This research investigated the methods of electronic delivery used on those contracts that required the electronic delivery of data. The results are depicted in figure 10 below.

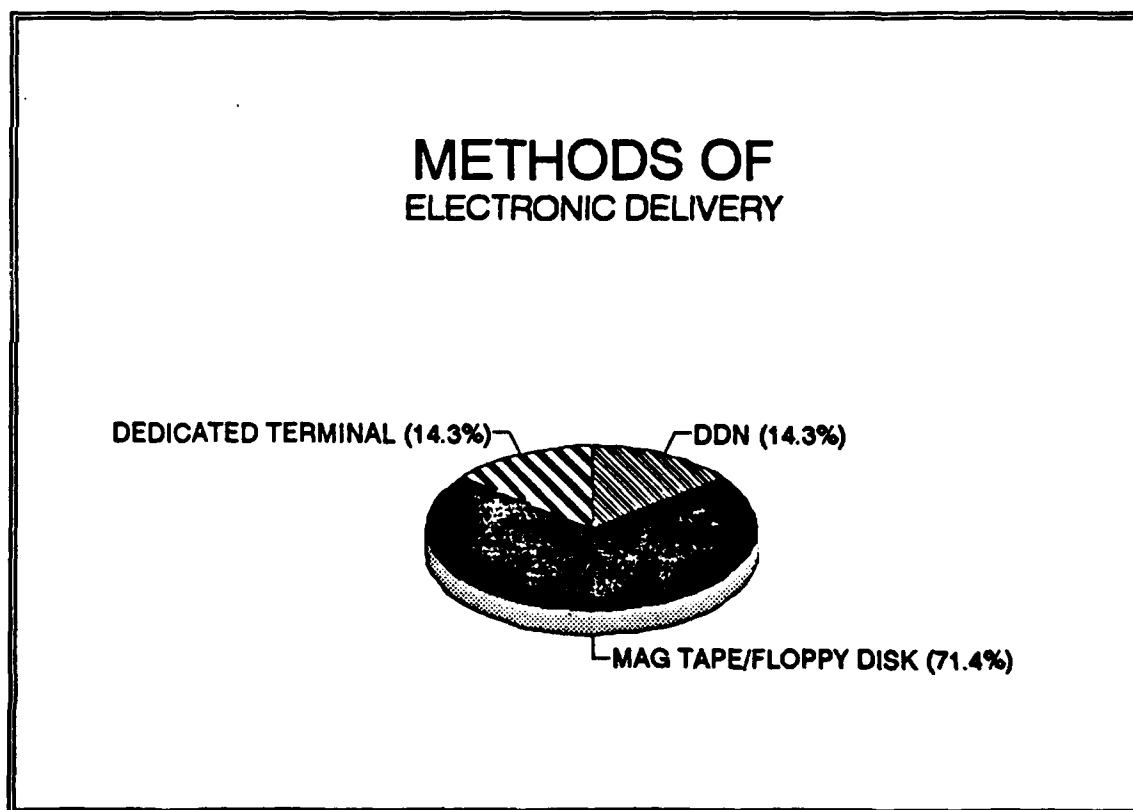


Figure 10. Methods of Electronic Delivery

These results are deceiving in that although magnetic tape or floppy disk appears to be used more, they are not used for all data item deliveries. The five contracts that are

using magnetic tape or floppy disk as the delivery methods are those contracts that are receiving only a few data items electronically. The other two contracts require electronic delivery of all contract deliverables and are using either a dedicated circuit or file transfer through the DDN as the delivery method.

#### Application of Electronic Delivery to non-CDRL Item Data

The results regarding electronic delivery of non-CDRL items are interesting but not surprising. On 104 of 109 contracts, electronic delivery of non-CDRL item data is being used. The methods used for delivery were either the facsimile machine (Fax), disk file transfer, electronic mail (over either DDN or dedicated circuit), or a combination of methods. The results were not surprising because the use of the Fax was included as an option for electronic delivery. The Fax machine was used on 104 of the contracts, Floppy Disk/Magnetic tape was used on 9 contracts, and E-Mail was used on 2 contracts.

The primary purpose for using the Fax machine was to provide advance copies of information. Examples of items transmitted via the fax include: incoming data deliverables from the contractor, government response letters to the contractor, or copies of contract modifications or general correspondence such as meeting minutes and agendas. In almost all cases the respondent stated that fax transmittals were followed with a mailed hardcopy. The reason a hardcopy



(with signatures) is needed is that an original copy of a document has to be kept in the contract file. Also, several individuals mentioned that the paper used in Fax machines tends to yellow quickly, therefore, some offices make copies of incoming Fax's to use as temporary copies in the official files until the official copy is delivered. The process of using the Fax provides information faster than using the mail; however, there is an increase in the amount of paper generated and an "official" copy is still mailed.

The use of flexible floppy disk has also been used to receive pricing data associated with contract proposals. In this way, the pricing information is downloaded and reformatted for analysis and inclusion into other reports. On one contract, draft specifications are received on floppy disk. Corrections and comments are made to the specification as necessary and the specification returned to the contractor for formal submittal.

E-mail was mentioned by two respondents. E-mail is available for use on one contract but neither the government nor the contractor are taking advantage of this capability. On a second contract, everything is sent over a dedicated circuit and the government also has limited access to view the contractor's data. This type of access is similar to the CITIS discussed in Chapter II.

Conclusions based on the results and analysis provided in this chapter are presented in chapter V. Also, with

these conclusions, are recommendations for addressing issues generated as a result of this study.

## V. Conclusions and Recommendations

### Conclusions

The objective of this research was to determine the extent that electronic delivery of contractor data is being used on contracts with the ASD and the HSD. This study addressed Contract Data Requirements List (CDRL) items as well as non-CDRL items. To meet this objective, the following four subobjectives were developed.

Subobjective 1. Analyze the extent to which electronic data delivery is being used by program offices within ASD and HSD.

This study has revealed that electronic delivery of data is not the primary method for delivery of contracting data. The primary method is still hardcopy. Less than seven percent of the contracts reviewed are using some form of electronic delivery for contract deliverables. These percentages appear low; however, it wasn't until February 1991 that electronic delivery became a policy of the Department of Defense when DODI 5000.2 was approved. Results of the mail survey responses indicate that although many programs are not using electronic delivery now, additional programs are expected to utilize electronic delivery on future contracts.

Informal usage of electronic transfer of data is being used on almost every contract. The primary method is the facsimile (fax) machine which was used on almost 95% of the contracts to pass advance copies of documents to and from the contractor. Consistent with the literature, the main reason the facsimile was not used for formal deliveries was because it was felt by the respondents that is necessary to have an original copy of the deliverable in the official file.

There are several phases that businesses go through as any new communications technology develops:

1. We learn to accept the medium (over time).
2. We become comfortable with the technology.
3. We begin to use the medium creatively.
4. The new medium becomes a major form of communications, we start to rely on it (1:223).

In the context of this development, the Air Force is somewhere between phase one and two. As the use of electronic transfer of data in the commercial sector continues to rise, a similar increase in the electronic delivery of data is expected within the DOD.

Subobjective 2. Identify the current requirements concerning digital delivery of contractor data and the anticipated benefits of using digital data versus paper copies.

The current requirements to use digital delivery of data are specified in DODI 5000.2, "Defense Acquisition

Management Policies and Procedures." The direction is further detailed in the "Computer Aided Acquisition Logistics Support (CALS) handbook" (MIL-HDBK-59), which serves as the standard to follow when applying digital delivery of data to a contract. Service and command level regulations concerning management of contractor data are still being revised to reflect changes in DODI 5000.2. Most of the guidance in the area of electronic delivery of data is in the transfer of technical data.

The benefits of electronic delivery of data discussed as part of the mail survey and telephone interview are consistent with those described in the literature review. Particularly, speed of transmission, flexibility, manipulation of data in the received documents, and ease of document retransmittal were all mentioned by respondents as benefits of using electronic delivery of data.

Subobjective 3. Identify problem areas or perceived problem areas which prevent the effective use of electronic data delivery.

This study revealed that there are three main problems areas, two are legitimate concerns and the other is a perceived problem. The three problems are:

1. there is a lack of resources or capabilities for the government to accept electronic delivery of data.
2. there is a lack of training in the area of electronic communications.
3. there is a lack of guidance concerning the policy and the requirements for use of digital data delivery.

The lack of resources or capabilities appears to be a perceived problem because over 95% of the respondents either have a computer on their desk or share a computer with other in their immediate duty area. This perception may exist because throughout the interview process there was the expectation by respondents that electronic delivery required a highly complex, expensive computer system. With training and guidance, this perception should be overcome.

Lack of training and lack of guidance in the area of electronic communications are legitimate concerns. Almost 70% of the respondents received less than two hours of training in the use of E-mail which is the most basic form of electronic communications. Additionally, results indicate that one could expect with 95% confidence that no more than 42% of acquisition personnel are aware of the current requirements regarding the digital delivery of contractor data.

Subobjective 4. Determine what lessons can be gained from those program offices that have implemented or are attempting to implement the electronic delivery of contractor data?

Electronic delivery is still a new approach for receiving contractor data. Therefore, the experiences and lessons learned are very limited. The lessons as discussed by survey respondents primarily focused on the fact that the mediums used must be compatible between the government and

the contractor. This requires that the contract specify the particular government software and hardware with which the contractor must interface when data is delivered digitally.

Considering the amount of non-CDRL data delivered through digital means there appears to be a desire on the part of both the contractor and the government to pass data electronically. A major step toward realizing this mutual goal is to formally require digital data delivery in the contract.

#### Limitations of Research

As previously noted, a limitation of this research was the selection criteria for determining interview subjects. The selection criteria did not take into account contracts awarded prior to 1 October 1989. Acquisition personnel in many of the older major weapon system programs were not interviewed because those contracts were awarded in the early to mid-'80s.

Another limitation of this research was that this study focused only on government acquisition personnel at ASD and HSD. With minor modifications to the interview guide and survey questionnaire, this study could be performed on other populations.

#### Recommendations

Future Studies. There are many possible follow-on studies in the area of electronic delivery of contractor data. Three recommended projects are described below.

One area for further research is to perform a similar study of government contractors to determine the extent that these individuals are trained in data management, primarily as it relates to electronic communications. It would be valuable to know the extent to which prime contractors and subcontractors are using digital delivery of data.

Another future study would be to modify the selection criteria for the interview process to take into account modifications to, and options exercised on, major weapon system contracts in the past two years to the present.

Because much of the guidance concerning electronic delivery of data concentrates on the delivery of technical data, a research study could evaluate the delivery process for non-technical CDRL items to determine the extent that this data could be delivered electronically to the government using existing communications methods.

General Recommendations. The fax machine has become a common link to transmit data quickly between the government and the contractor and allows information to be passed more quickly. However, the use of the fax has increased the amount of paper generated while it is still necessary to send hardcopies. Because a majority of the individuals already use E-mail, it is recommended that E-mail be used to transmit much of the correspondence (memos and advance copies of contract letters) that is currently being delivered via a fax. If a contractor does not have E-mail



capability, the government should investigate the installation of fax-servers on its current LAN systems.

It is also recommended that the requirements and guidance for the digital delivery of data specifically address non-technical data items as well as technical data. This is recommended because non-technical data items could be more easily transmitted using existing e-mail capabilities.

Additionally, many individuals already have access to a LAN. However, a majority of these individual have received little or no training in the use of the LAN. Therefore, it is recommended that as individuals are provided access to a LAN, they are also provided the necessary training.

It is also recommended that current requirements and guidance concerning the digital delivery of contractor data should be provided to acquisition personnel, including support contractor personnel.

Appendix A: Electronic Delivery of Contractor Data Survey

LSY (Capt Farkas, DSN: 785-8989)

3 Jul 91

Electronic Delivery of Contractor Data Survey Package

Survey Recipient:

1. Please take the time to complete the attached questionnaire and return it in the enclosed envelope by 17 July 1991.
2. This survey examines the extent to which contractor data is being submitted by electronic means on government contracts. The data we gather will become part of an AFIT research project and may influence the way contractors submit data in the future. Your individual responses will be combined with others and will not be attributed to you personally.
3. Your participation is completely voluntary, but we would certainly appreciate a few minutes of your valuable time. For further information contact Capt Grant at DSN: 785-3355.

Arthur A. Munguia  
Assoc Prof of Systems Management  
Questionnaire  
School of Systems and Logistics  
Envelope

- 2 Atch  
1.  
2. Return

**Electronic Delivery of Contractor Data Survey**

The following survey contains a combination of multiple choice and short answer questions. Please read each question carefully and then record your response directly on the survey form. If you need more space to answer a particular question, feel free to use the reverse side of the survey form. Thank you for your time.

**1. Please list your specific job title and position.**

**2. What is your current rank or grade level? (Please circle one)**

- a. O-1 to O-3
- b. O-4 to O-5
- c. E-1 to E-5
- d. E-6 to E-9
- e. GS4 to GS5
- f. GS6 to GS7
- g. GS8 to GS11
- h. GS12 to GS13
- i. Other: \_\_\_\_\_

(please clarify)

**3. How long have you been working in data management? (Please circle one)**

- a. less than 1 year
- b. 1 to 2 years
- c. 2 to 3 years
- d. 3 to 4 years
- e. more than 4 years

**4. How much of your work time is spent working in data management? (Please circle one)**

- a. less than 5%
- b. 5 - 10 percent
- c. 10 - 25 percent
- d. 25 to 50 percent
- e. 50 to 75 percent
- f. greater than 75 percent

**5. What data management related courses have you attended? When?**  
(Please circle the letter corresponding to each course you have taken and provide the month and year you took the course in the space provided)

- a. SYS 370 Defense Data Management
- b. SYS 150 Engineering Data Management
- c. Other:

**6. Consider only the time you spend working on data management activities. Please allocate the time you spend to each of the following data management activities. (Please estimate the percent of time spent on each activity and record the percent in the space provided next to each activity. The total time allocated should sum to 100%)**

- | <u>Data Management Activity</u>                               | <u>% Time</u> |
|---|---------------|
| a. Data requirements definition (AF Form 585 preparation)     |               |
| b. Data entry (AF Form 1423 preparation, input tracking data) |               |
| c. Data tracking  |               |
| d. Data review  |               |
| e. Other:   |               |

**7. Which of the following requirements are specified by DODI 5000.2 concerning the electronic delivery of contract data deliverables? (Please circle the correct response)**

- a. Contract deliverable data will be prepared and used in digital form on contracts for computer resources with total costs of greater than \$2 million.
- b. Contract deliverable data will be prepared and used in digital form on all contracts following the Milestone 1 decision.
- c. Contract deliverable data in digital form will be prepared and used with the approval of the base communications officer on all contracts awarded after 30 September 1990.
- d. Contract deliverable data will be prepared and used in digital form unless it is not cost-effective for the government.
- e. All of the above.
- f. I don't know.

**8. Describe the computer resources available to you at work. (Please circle all appropriate responses)**

- a. Personal computer on my desk.
- b. I share a personal computer with others in my duty area.
- c. I have a Vax (mainframe) terminal in my immediate duty area.
- d. There are no computer resources available for my use.
- e. Other (explain):

**9. How many hours of formal training have you had in the use of E-mail? (Please circle one)**

- |              |                          |
|--------------|--------------------------|
| a. none.     | b. 1-2 hours             |
| c. 3-4 hours | d. 5-6 hours             |
| e. 7-8 hours | f. greater than 8 hours. |

**10. How often do you use Electronic-Mail (E-Mail)? (Please circle one)**

- a. At least once a day.
- b. At least once a week.
- c. At least twice a month.
- d. Once a month or less frequently.

**11. What is your E-Mail user name? (Please write your user name on the space provided. If you are unsure, please explain)**

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**12. Do you use a computer for data management? (Please circle one)**

- a. Yes
- b. No

**13. If you do not use a computer for data management, what are the primary reasons you do not? (Please list the reasons you do not use a computer for data management in the space provided)**

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**14. Do you have access to a Local Area Network (LAN) within your duty area? (Please circle one)**

- a. Yes
- b. No
- c. I don't know if I have access to a LAN.
- d. I don't know what a LAN is.

**15. How much training have you received in the use of Local Area Networks (LANs)? (Please circle one)**

- a. less than 4 hours
- b. 4-8 hours
- c. 8-12 hours
- d. 12-16 hours
- e. greater than 16 hours
- f. none.

**16. Are you working on any programs that require electronic delivery of data? (Please circle one)**

- a. Yes
- b. No (go to question 20)

**17. Why was the electronic delivery of data used? (Please explain)**

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**18. What benefits are you experiencing due to the electronic delivery of contractor data? (Please describe)**

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**19. What are the drawbacks you have experienced due to the electronic delivery of contractor data? (Please describe)**

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**20. Why is electronic delivery of contractor data not being used? (Please explain)**

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**21. Are you receiving from the contractor or transmitting to the contractor other contract related correspondence using electronic means? \_\_\_\_\_**  
**If yes, what type of data and how is it transmitted/received?**

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## Appendix B: Interview Guide

1. Are you using electronic delivery of data items on contract # \_\_\_\_\_  
\_\_\_\_\_? YES or NO?

**If no go to Question 10.**

2. Is the government receiving all contract deliverables through electronic means? YES or NO?

**If yes, go to Question 5.**

3. Which data items are you receiving electronically?

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4. Why aren't all data deliverables received electronically?

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5. How are you receiving the data deliverables? If difficult to answer, the following examples are provided. Also, briefly describe the process.

- a. Through the Defense Data Network (DDN)
- b. Through a dedicated terminal.
- c. Through a FacSimile (FAX) machine.
- d. On magnetic tape or floppy disk.
- e. Other.

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**6. What benefits have you realized using electronic delivery of data items?**

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**7. What drawbacks have you experienced using electronic delivery of data items?**

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**8. What would you do differently concerning the delivery of contractor data?**

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**9. Are you receiving from the contractor or transmitting to the contractor other contract related correspondence using electronic means? YES or NO? If yes, what type of data and how is it transmitted/received?**

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**10. Why was the electronic delivery of contractor data not used on this contract?**

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**11. Are you receiving from the contractor or transmitting to the contractor other contract related correspondence using electronic means? YES or NO? If yes, what type of data and how is it transmitted/received?**

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### Appendix C: Survey Response Summary

#### 1. Please list your specific job title and position.

Data Management	39	Logistics	1
Configuration Management	30	Engineering	3
Program Management	3	Other	2

#### 2. What is your current rank or grade level? (Please circle one)

##### Responses

a. O-1 to O-3	5
b. O-4 to O-5	1
c. E-1 to E-5	0
d. E-6 to E-9	1
e. GS4 to GS5	6
f. GS6 to GS7	5
g. GS8 to GS11	11
h. GS12 to GS13	23
i. other	26

Total number of respondents 78

#### 3. How long have you been working in data management? (Please circle one)

##### Responses

a. less than 1 year	10
b. 1 to 2 years	9
c. 2 to 3 years	7
d. 3 to 4 years	10
e. more than 4 years	37
f. no response	5

#### 4. How much of your work time is spent working in data management? (Please circle one)

##### Number of Responses

a. less than 5%	13
b. 5 - 10 percent	7
c. 10 - 25 percent	14
d. 25 to 50 percent	10
e. 50 to 75 percent	5
f. greater than 75 percent	30

**5. What data management related courses have you attended? When? (Please circle the letter corresponding to each course you have taken and provide the month and year you took the course in the space provided.)**

**Responses**

a. SYS 370	Defense Data Management	46 yes	32 no
b. SYS 225	Engineering Data Management	16 yes	62 no
c. Other:		20 yes	58 no

**6. Consider only the time you spend working on data management activities. Please allocate the time you spend to each of the following data management activities. (Please estimate the percent of time spent on each activity and record the percent in the space provided next to each activity. The total time allocated should sum to 100%)**

6a. 0% - 22  
 1% - 1  
 2% - 2  
 3% - 2  
 5% - 14  
 10% - 11  
 15% - 7  
 20% - 3  
 25% - 2  
 30% - 4  
 40% - 1  
 50% - 1  
 100% - 1  
 no ans. - 7

6b. 0% - 36  
 2% - 2  
 3% - 2  
 5% - 2  
 10% - 6  
 15% - 2  
 20% - 6  
 25% - 6  
 30% - 1  
 40% - 2  
 45% - 2  
 48% - 1  
 50% - 3  
 60% - 1  
 no ans. - 7

6c. 0% - 19  
 1% - 1  
 3% - 1  
 5% - 1  
 10% - 9  
 15% - 4  
 20% - 4  
 25% - 10  
 30% - 7  
 35% - 1  
 40% - 1  
 45% - 4  
 50% - 6  
 55% - 1  
 70% - 1  
 no ans. - 7

6d. 0% - 19  
 5% - 8  
 10% - 13  
 15% - 2  
 20% - 6  
 25% - 10  
 30% - 2  
 40% - 7  
 45% - 4  
 50% - 4  
 80% - 2  
 90% - 2  
 97% - 2  
 no ans. - 7

6e. 0% - 9  
 5% - 3  
 10% - 4  
 20% - 2  
 25% - 1  
 25% - 1  
 30% - 1  
 40% - 3  
 45% - 1  
 50% - 0  
 60% - 2  
 70% - 1  
 75% - 3  
 80% - 2

6e. 90% - 2  
 95% - 1  
 100% - 3  
 no ans - 6

**7. Which of the following requirements are specified by DODI 5000.2 concerning the electronic delivery of contract data deliverables? (Please circle the correct response.)**

- a. Contract deliverable data will be prepared and used in digital form on all contracts with total costs of greater than \$2 million.
- b. Contract deliverable data will be prepared and used in digital form on all contracts following the Milestone 1 decision.
- c. Contract deliverable data in digital form will be prepared and used on all contracts awarded after 30 September 1990.
- d. Contract deliverable data will be prepared and used in digital form unless it is not cost-effective for the government.
- e. All of the above.
- f. I don't know.

**Responses: a. 1 b. 0 c. 2 d. 23 e. 5 f. 46**  
**no ans. 1**

**8. Describe the computer resources available to you at work. (Please circle all appropriate responses)**

- a. Personal computer on my desk.
- b. I share a personal computer with others in my duty area.
- c. I have a Vax (mainframe) terminal in my immediate duty area.
- d. There are no computer resources available for my use.
- e. Other (explain):

**Responses: a. 54 yes 24 no**  
**b. 20 yes 58 no**  
**c. 16 yes 62 no**  
**d. 2 yes 76 no**  
**e. 4 yes 74 no**

9. How many hours of formal training have you had in the use of E-mail? ( Please circle one)

Responses

a. none	32
b. 1-2 hours	24
c. 3-4 hours	13
d. 5-6 hours	0
e. 7-8 hours	5
f. greater than 8 hours	4

10. How often do you use Electronic-Mail (E-Mail)? (Please circle one)

Responses

a. At least once a day.	46
b. At least once a week.	8
c. At least twice a month.	5
d. Once a month or less frequently.	16
no answer	3

11. What is your E-Mail user name? (Please write your user name on the space provided. If you are unsure, please explain)

Responses: 68 knew their user name  
6 did not know their user name  
4 did not answer this question

12. Do you use a computer for data management? (Please circle one)

Responses: 59 yes  
18 no  
1 no answer

13. If you do not use a computer for data management, what are the primary reasons you do not? (Please list the reasons you do not use a computer for data management in the space provided)

**14. Do you have access to Local Area Network (LAN) within your duty area? (Please circle one)**

- a. Yes
- b. No
- c. I don't know if I have access to a LAN.
- d. I don't know what a LAN is.

**Responses**

- a. 56
  - b. 4
  - c. 13
  - d. 2
- 3 no answer

**15. How much training have you received in the use of Local Area Networks (LANs)? (Please circle one)**

**Responses**

- |                          |    |
|--------------------------|----|
| a. less than 4 hours     | 21 |
| b. 4-8 hours             | 7  |
| c. 8-12 hours            | 1  |
| d. 12-16 hour            | 3  |
| e. greater than 16 hours | 4  |
| f. none.                 | 40 |
- 2 no answer

**16. Are you working on any programs that require electronic delivery of data? (Please circle one)**

**Responses**

- |                           |    |
|---------------------------|----|
| a. Yes                    | 11 |
| b. No (go to question 20) | 67 |



**17. Why was the electronic delivery of data used? (Please explain)**

**Responses:**

1. To reduce paperwork.
2. It's required.
3. No answer. (1)
4. For speed, reduction in cost, and ease of filing.
5. Information concerning service reports can go directly into data base (info center).
6. Management of data is enhanced and is made available to all.
7. Able to manipulate the data when changes are needed.
8. We are procuring a large data intensive automated training system which will have all of the documents stored electronically on the system. Most of the CDRLS will be used for system maintenance and must be electronically stored. We also have a direct electronic line established with the contractor.

**18. What benefits are you experiencing due to the electronic delivery of contractor data? (Please describe)**

**Responses:**

1. Not sure.
2. None yet, not on contract.
3. No answer. (1)
4. Speed, reductions in cost and ease of filing.
5. Receiving drawings on magnetic tape and 90% of service reporting is accomplished through computer generated E-MAIL.
6. Anyone requiring a copy can get one.
7. More flexibility.
8. Direct link is quicker than mail. Feedback on draft correspondence can be done on-line and quickly. Documents can be imported to other documents. Part or as a whole, so that wording can be revised and consistent. Can transmit documents as is via DDN to other organizations. Not as much paper to shuffle. Easy to reproduce. Helps toward achieving CALS compliance.

19. What are the drawbacks you have experienced due to the electronic delivery of contractor data? (Please describe)

Responses:

1. It's too new. Need procedures and guidance in the following areas:

- a. Does access constitute delivery?
- b. Use of contractor system with government access to read versus transfer to government computer.
- c. Compatibility of government terminals with contractor's computer media.
- d. Need for 1423 versus contractor system under which information is "available".

2. Difficult to review if no hardcopy is available.

3. Specific software packages and version numbers need to be specified in the DID.

4. AF contracts offices don't like it very much. They like transmittals going from company to company on paper with real signatures. Must be very specific about the electronic format selected. Choose what's best for you, i.e. ASCII, Word Perfect, Enable, etc. Have to be careful with document configuration management, documents are easy to change.

20. Why is electronic delivery of contractor data not being used? (Please explain)

Table 4.

Question 20 Summary of Results

REASON	NUMBER OF RESPONSES
No Capability	1
Found not cost effective	4
No Answer	11
Old Programs	15
Not currently using, will be in the future	9
Not completely hooked up	1
Don't know	13
Not considered	3
Need guidance	4
No uniform medium	1
Resources not available	3
Problem making hardcopies	1
Prefer hardcopy	1

21. Are you receiving from the contractor or transmitting to the contractor other contract related correspondence using electronic means? If yes, what type of data and how is it transmitted/received?

E-MAIL	nr. of responses
correspondence	4
schedule	2
AFTO Form 349s	1
some CDRL items	1
Service reports	3

Draft correspondence of all kinds as well as informal notes and messages (direct links to the contractor). Graphics files and other executable programs are received as well.

**FAXING** **Nr. of Responses**

1423s	(1)
schedule	(2)
some CDRLs	(1)
when timely	(2)
LTRs/memos	(2)
Draft - minutes/agendas	(1)
letters	

**DISK/TAPE**

miscellaneous	(1)
some CDRL items	(1)

## Appendix D: Interview Response Summary

### Question 1.

**Response : 7 YES    102 NO    17 Unable to contact**

2. Is the government receiving all contract deliverables through electronic means? If yes, go to Question 5.

**Response: 2 YES    5 NO**

3. Which data items are you receiving electronically?

**Response:**

**software configuration items**

**software documentation**

**provisioning**

**test specifications**

**software code brought in electronically**

**all data (2 respondents)**

**only post production support analysis, which is a list of tests for in-house production and testing**

**schedules and drawings**

4. Why aren't all data deliverables received electronically?

**Response: No standardization**

5. How are you receiving the data deliverables? If difficult to answer, the following examples are provided. Also, briefly describe the process.

a. Through the Defense Data Network (DDN)

b. Through a dedicated terminal.

c. Through a Facsimile (FAX) machine.

d. On magnetic tape or floppy disk.

e. other.

**Responses:**

**5 magnetic tape or floppy disk file transfer**

**1 file transfer using the VAX (still working on becoming compatible with the contractor's system)**

**1 through a dedicated terminal**

6. What benefits have you realized using electronic delivery of data items?

**Response:**

- less paperwork
- saving time
- speed of delivery, even faster than express mail
- turn around time to review CDRL's and to get comments back to contractor improved, this includes being able to more easily deal with the ALC's to get comments.
- flexibility to take contractor data and add it to larger reports
- more expedient

7. What drawbacks have you experienced using electronic delivery of data items?

**Response:**

Not having an integrated package that all parts of the Air Force are familiar with.

Contractor not compatible with ALC.

Still too new - unable to comment.

As long as systems are compatible there haven't been any problems.

The contractor became compatible with the government.

Technical glitches of down time; however, still faster than using mail.

8. What would you do differently concerning the delivery of contractor data?

**Response:**

If the government imposes requirements then they should provide a complete integrated package to the contractor.

3 Nothing yet.

2 Still too new!

9. Are you receiving from the contractor or transmitting to the contractor other contract related correspondence using electronic means? If yes, what type of data and how is it transmitted/received?

The response to this question has been included with question 11 findings

10. Why was the electronic delivery of contractor data not used on this contract?

**Number of Responses**

1. Many CDRLs are classified.	1
2. Too expensive.	1
3. Still need hardcopy.	2
4. Compatibility.	1
5. Not set up.	2
6. No reason.	11
7. Small businesses.	17
8. No CDRLs.	5
9. Not considered.	3
10. Few CDRLs.	4
11. Not required.	9
12. Not trained.	14
13. FMS contractor.	1
14. Rushed to get on contract.	2
15. Commercial nature of program.	1
16. Not aware of capabilities.	7
17. Didn't know.	14
18. Small Business Research Project.	9

11. Are you receiving from the contractor or transmitting to the contractor other contract related correspondence using electronic means? If yes, what type of data and how is it transmitted/received?

**Responses:**

<b>Fax</b>	<b>Disk</b>	<b>E-Mail</b>
104 yes 5 no	9 yes	2 yes

**Fax:**

1. For advance copies. 100
2. Anything but formal submittals. 1
3. General correspondence (agendas, minutes). 3
4. Only when necessary to expedite. 1
5. MODs. 2
6. Both draft and formal. 4

**Disk:**

1. Pricing information. 2
2. Proposals (more efficient, manipulation of data). 2
3. Draft specifications, corrections made and returned for formal submittal. 1

**E-Mail:**

1. Not getting alot of usage.

**Dedicated terminal:**

1. Everything is sent over this terminal. The government has limited access to view the contractor's data.



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### Vita

Captain Kenneth J. Farkas was born on 14 November 1959 in Pittsburgh, Pennsylvania. He graduated from high school in Swarthmore, Pennsylvania in 1977 and enlisted in the United States Air Force as a Telecommunications Operations Specialist. In 1983 he was selected for the Airman Education Commissioning Program and attended the University of Florida in Gainesville, Florida from which he received the degree of Bachelor of Science in Civil Engineering in December 1985. In April 1986, he received a commission in the USAF through the Officer Training School in San Antonio, Texas. From 1986 until 1990 Captain Farkas served as program engineer on several medical, chemical defense and tactical life support system programs while stationed at Brooks AFB, Texas in the Human Systems Division. These programs included the Survivable Collective Protection System - Medical (SCPS-M) and the Combined Advance Technology Enhanced Design G-Ensemble (Combat Edge). In June 1990 he entered the School of Systems and Logistics, Air Force Institute of Technology.

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**AFIT RESEARCH ASSESSMENT**

The purpose of this questionnaire is to determine the potential for current and future applications of AFIT thesis research. Please return completed questionnaires to: AFIT/LSC, Wright-Patterson AFB OH 45433-6583.

1. Did this research contribute to a current research project?

- a. Yes                      b. No

2. Do you believe this research topic is significant enough that it would have been researched (or contracted) by your organization or another agency if AFIT had not researched it?

- a. Yes                      b. No

3. The benefits of AFIT research can often be expressed by the equivalent value that your agency received by virtue of AFIT performing the research. Please estimate what this research would have cost in terms of manpower and/or dollars if it had been accomplished under contract or if it had been done in-house.

Man Years \_\_\_\_\_ \$ \_\_\_\_\_

4. Often it is not possible to attach equivalent dollar values to research, although the results of the research may, in fact, be important. Whether or not you were able to establish an equivalent value for this research (3 above), what is your estimate of its significance?

- a. Highly Significant      b. Significant      c. Slightly Significant      d. Of No Significance

5. Comments

\_\_\_\_\_  
Name and Grade

\_\_\_\_\_  
Organization

\_\_\_\_\_  
Position or Title

\_\_\_\_\_  
Address